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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

MAY 15 2013

OFFICE OF
COMPLIANCE AND ENFORCEMENT

Reply to: OCE-127

**Certified Mail Number 7012 1010 0003 2872 5584**
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J. Wayne Maxie, R.G.
Manager, Environmental Projects
Agrium US, Inc.
4582 S Ulster Street Suite 1700
Denver, CO 80237-2641

Re: Comments to February 15, 2013 Site Assessment Report
Administrative Order on Consent for Nu-West Industries, Inc.
Idaho Facility, Docket No. RCRA-10-2009-0186

Dear Mr. Maxie:

EPA has reviewed the Site Assessment Report ("Report") dated February 15, 2013 for the Nu-West Industries, Conda Phosphate Operations facility. The Report is disapproved. In accordance with paragraph 68 of the Administrative Order on Consent (AOC), a list of comments are provided with this letter identifying deficiencies with the submission. In accordance with paragraph 69 of the AOC, Nu-West Industries is required to submit a revised submission within 30 days that addresses EPA comments.

Several EPA comments to the Report identify data gaps and the need to conduct additional sampling, surveys, or other work. EPA proposes a conference call to discuss how those data needs can be best met. We are available to participate in a conference call May 20 – 23. Please let me know of your availability to participate in such a conference call.

Thank you for your attention to this important matter.

Sincerely,

Peter Magolske
Air and RCRA Compliance Unit

enclosure

cc: Brian Monson, Idaho Department of Environmental Quality
P. Scott Burton, Esq. Hunton and Williams LLP
Timothy J. Carlstedt, Esq. Hunton and Williams LLP

# EPA Comments to February 15, 2013 Site Assessment Report

## Comment 1:

No data quality assessment was included in the Report. For a data quality assessment, the Report needs to contain sections that discuss the following:

- The data validation process as well as any conclusions regarding the quality of the data stemming from the validation of the analytical data. This discussion should also include a list of the data validation qualifiers that will be used in this project and their definitions.

- Reconciliation of the project data with the Data Quality Objectives presented in the Quality Assurance Project Plan (QAPP). This discussion would describe data usability, uncertainty, and limitations as well as reporting if all project measurement performance criteria were met.

Both of these data quality assessment sections are consistent with items that are required in the project QAPP. Sections 3.2 (Reports to Management) and 4.2 (Verification and Validation Methods) describe how analytical data will be validated, a report will be created, and the reports will be provided to the Project Manager. Sections 3.2 and 4.3 (Reconciliation with User Requirements) call for the Site Assessment Report to include an assessment of the overall analytical program results and a description of the limitation and impact on the use of the data.

Furthermore, in terms of data validation, no data validation reports were found in either the Site Assessment Report or in the analytical data files in the appendices. Additionally, it did not appear that validation qualifiers were added to the analytical results besides the qualifying flags placed by the laboratory. The laboratory case narratives explain that there were several Quality Control (QC) sample control limit exceedances affecting numerous samples; however, there were no corresponding validation qualifiers. Finally, the Non-Conformance Reports from ALS Laboratory Group presented calibration issues due to analyst error that bias the data, and this should have been further described in the validation reports or Site Assessment Report.

The work required by the QAPP was not carried out and completed.

The above information is required. EPA also requests that copies of the raw instrument data/print-outs of the analytical data be provided with the revised report. The Accutest laboratory data contained the sample summary forms of the analytical and QC results, but no instrument raw data. As the information is expected to be quite voluminous, EPA prefers that it be provided electronically on CD or DVD.

## Comment 2:

Groundwater sampling for the Report was spread over three separate events. Due to the potential for transient conditions in aquifers to change the concentrations and pathways of constituents of concern, future sampling events will need to be synoptic. When all wells are sampled at approximately the same time, the chemical and water-level relationships between wells will be better understood.

Groundwater samples were filtered prior to analyses and data was reported on a dissolved metals basis, introducing a likely low bias to the data. As EPA and Nu-West discussed on February 25, 2013, future groundwater sampling carried out under the Administrative Order on Consent shall be unfiltered. EPA's March 6, 2013 letter spoke to this issue.

**Comment 3:**

Section 12 of the Revised Sampling and Analysis Work Plan for Site Characterization Nu-West Industries, Inc. Conda Phosphate Operations, dated June 29, 2010 ("Work Plan"), stated that the Report would include at a minimum the following:

- figures illustrating Site conditions, including but not limited to:
    - Site stratigraphy including subsurface information on updated cross sections.

Basalt stratigraphy was included in the Report on Work Plan for Additional Requirements dated April 26, 2012, but it was missing in this Report.

Addition of the basalt stratigraphy information allows the reviewer of the Report to correlate which flow-top or other stratigraphic feature in the basalt corresponds to the screened interval of a specific well. At this time, this data is available only for section B-B'. As more wells are added off this section line with the necessary geophysical data, other cross sections need to be augmented with specific basalt stratigraphy.

Include the stratigraphic data on basalt flows to the cross sections in the Report, as required per the Work Plan.

**Comment 4:**

EPA requests that tabulated data be provided in an Excel spreadsheet or electronically readable database.

**Comment 5:**

Page 8, section 2.5.7 of the Report states the following:

> Most tank farms are surrounded by and concrete containment slab

The sentence is unclear. Please clarify.

**Comment 6:**

Page 19, section 4.1.3 of the Report states the following:

> Due to the limited mobility of radiological parameters, only the 1-2 feet bgs interval was analyzed for gross alpha and gross beta.

Given the discovery of shallow, low-pH fluid under portions of the facility, several of the assumptions regarding mobility and subsurface distribution of constituents of concern, including the radiological parameters, require additional analysis. For example, groundwater monitoring wells A-34-022 and A-36-105 are located approximately 700 feet apart and screened at different horizons. Antimony was found to have exceeded the federal MCL in samples from both monitoring wells and gross beta activity was the highest at these two locations from all monitoring to date. In light of this information, the validity of limiting analysis to only the shallow horizons appears questionable. This is a data gap that will need to be addressed through additional sampling of both soil and groundwater.

**Comment 7:**

Page 20, section 4.2, paragraph 3 of the Report states the following:

> The only other constituent detected above an EPA industrial soil RSL was radium 226. Samples from borings SB-45, SB-54, SB-67, and SB-82 contained radium 226 levels above the subsurface soil criterion of 15 pico Curies per gram (pC/g). Field gamma radiation measurements exhibited very little variation across the Facility, screening levels were between 0.01 and 0.04 milli Rhems per hour (mR/hr) with the majority being between 0.02 and 0.03 mR/hr. Overall, field gamma radiation measurements showed no correlation with laboratory measurements for radium 226. A linear regression was performed to assess the potential relationship between gross alpha and radium-226 measurements. For the 22 samples 21 analyzed for both parameters, the results (R2 = 0.62) suggests that gross alpha values greater than approximately 60 pC/g are potentially correlated with radium-226 values greater the industrial subsurface soil RSL of 15 pC/g. Gross alpha above 60 pC/g was detected in samples collected from 12 locations, with the highest levels being near the hazardous waste storage building (SB-3 and SB-4), process sewer sump (SB-54), and dry products loading area (SB-65, SB-66, and SB-67).

Soil samples obtained from the 1-2 foot depth were the only samples analyzed for gross alpha and gross beta radiological activity, per the Work Plan. Section 7.1.4 of the Work Plan stated the following:

> Due to the limited mobility of radiological parameters, only the 1-2 feet bgs interval will be analyzed for gross alpha and gross beta. Twenty-five percent of the samples submitted for gross alpha and gross beta will be analyzed for radium 226 and radium 228 analyses, covering a broad range of gross gamma field measurements and gross alpha laboratory analyses.

Section 7.1.5 of the Work Plan stated the following:

> The radiological data will be used to confirm that gross alpha, and potentially radium 226 and radium 228, activity concentrations in soil within the areas of interest at the Facility are similar to those identified in soil and sediment samples collected throughout the rest of the Site, including areas upgradient from the Main Processing Area, during the assessment. Radium 226 and other radionuclides in the naturally occurring uranium decay series emit gamma radiation, and field gamma radiation measurements will be compared with laboratory results to create a

correlation. Field gamma radiation measurements will be compared to the generated correlation to estimate the concentration of radium 226 in the soil samples not submitted for laboratory analysis.

No correlation was established between field gamma radiation readings and concentrations with radium 226 and the other radionuclides in the naturally occurring uranium decay series. The utility of conducting field gamma surveys as a proxy for determining radium 226 in the soil samples not submitted for laboratory analysis was not successful. This is a data gap that will need to be addressed through additional sampling.

Groundwater sampling analyses report that a sample from monitoring well A-34-022 had gross alpha activity of 510 pCi/l and gross beta activity of 940 pCi/l (see Table 8-14). A sample from monitoring well A-36-105 had gross beta activity of 59 pCi/l. A sample from monitoring well A-12 had a gross alpha activity of 16.2 pCi/l. Monitoring well A-12 is located approximately 600 meters west of the F-GYP-0 stack.

Analytical results of sample A-34-022 report a 0.72 pCi/l concentration of radium 226 (see Appendix 08-07). The radium 226 analysis does not fully account for the high levels of gross alpha and gross beta activity. The Conceptual Site Model (CSM) is silent on this, does not propose any recommendations on further study to determine either the source or the extent of migration of this contamination. This is a data gap that will need to be addressed through additional groundwater sampling.

There is insufficient data to support the supposition of limited mobility of radiological parameters. Given that past groundwater samples have been filtered prior to radiological analyses, the concentration of the various radiological contaminants in the groundwater is likely higher.

**Comment 8:**

Page 21, section 4.2, paragraph 2 of the Report states the following:

> In addition to arsenic and radium 226, cadmium and vanadium were the only constituents of interest detected at concentrations above the EPA residential soil RSL. Cadmium was detected in samples from 7 soil borings at concentrations above the RSL of 70 mg/kg and vanadium was detected in samples from 18 soil borings at concentrations above the RSL of 390 mg/kg. Samples with cadmium and/or vanadium detected above the EPA residential soil RSL were primarily limited to depth of less than 5 feet bgs. Ten of the metals—antimony, arsenic, barium, beryllium, cadmium, lead, nickel, selenium, thallium, and vanadium—were detected in samples from one or more boring locations at concentrations above either the EPA protection of groundwater RSL or IDEQ IDTL groundwater protection screening level. Generally, these criteria are an order of magnitude or more lower than residential soil direct contact RSLs. For antimony, barium, and beryllium only 13, 11, and 5 soil samples, respectively contained concentrations above the EPA protection of groundwater RSL. Cadmium, lead, nickel, selenium, thallium, and vanadium were detected above EPA groundwater protection RSLs in the Main Processing Area but generally decreased in concentration with depth.

The observation that concentrations decreased with depth may not be indicative of decreased risk due to the potential for ground-water interception and entrainment. This is particularly true when the low pH and the altered oxidation/reduction potential of the site groundwater are taken into consideration.

The soil sampling discussion lacks the specific findings, in particular the maximum observed concentrations for the different metals, wet chemistry and radiological parameters. Often, only the concentration of the deepest sample is discussed in the text. Other sampling depths (frequently in the middle range) yield samples with much higher values. The deepest values are discussed as though they demonstrate there is no potential for transport laterally in shallow groundwater or for heterogeneity in the distribution of preferential routes of delivery to depth.

Section 12 of the Work Plan stated that the Report would include at a minimum the following:

- a discussion and refinement of the Preliminary CSM, including constituent fate and transport and the potential for migration beyond the Facility boundary

Neither section 4.2 of the Report nor the CSM included a discussion of the constituent fate and transport. The Report will need to be revised to address the comments above.

**Comment 9:**

Page 21, section 4.2 of the Report states the following:

> Ammonia was detected above the IDEQ IDTL of 4.1 mg/kg in 398 samples of 448 samples analyzed. The IDTL is based on a child direct contact exposure scenario for subsurface soil (i.e., greater than 1 foot bgs). EPA has not established a RSL for ammonia. The highest ammonia concentrations were generally detected in samples below 4 feet bgs but not in the deepest samples analyzed.

Although EPA has not established a RSL for ammonia in soil, the high levels of ammonia present will geochemically convert to nitrate during nitrification, a microbial process by which reduced nitrogen compounds (primarily ammonia) are sequentially oxidized to nitrite and nitrate. [1] EPA has established a MCL of 10 mg/l for nitrate.

Numerous soil samples were reported to contain an ammonia concentration in excess of 1,000 mg/kg (i.e. SB-43, SB-45, SB-47, SB-48, SB-63, SB-64, SB-65, SB-66, SB-67, SB-71, etc.) and frequently at depths of as great as 20 feet below ground surface, where the deepest sample was obtained.

Shallow fluid has been identified at several locations within the main plant. This fluid and the infiltration of additional precipitation and snowmelt provide a transport mechanism for the solubility of ammonia and the resulting production of nitrate compounds into groundwater. The conversion of $NH_4$ to nitrate compounds has been well documented by groundwater hydrologists for years.

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[1] See: Nitrification, US EPA, August 15, 2002
*http://water.epa.gov/lawsregs/rulesregs/sdwa/tcr/upload/nitrification.pdf*

Groundwater samples from monitoring wells A-27-090, A-35-080, and MW-A-110 reportedly contained nitrate concentrations of 75.5, 56.4, and 198 mg/l respectively. Monitoring well A-35-080 is located adjacent to the SB-65, SB-66, and SB-67 locations, and monitoring well A-27-090 is located further west. Monitoring well MW-A-110 is located approximately 500 feet to the south of location SB-71.

Section 12 of the Work Plan stated that the Report would include at a minimum the following:

- a discussion and refinement of the Preliminary CSM, including constituent fate and transport and the potential for migration beyond the Facility boundary

The CSM fails to describe the fate and transport of the ammonia in the soil, its oxidation into nitrate / nitrite compounds, and its movement within the groundwater. This omission will need to be corrected in a revised CSM.

**Comment 10:**

Page 43, section 5, paragraph 1 of the Report states the following:

> This section presents the scope and findings of survey conducted to identify wetlands and surface water features in the vicinity of the CPO Facility. WSP retained Wetlands Resources of Logan, Utah to conduct the wetlands and surface water survey in September 2010. The survey extended one-mile downgradient and beyond the Facility's property boundary at the time. The objectives of the survey were to identify wetlands and surface water features within the survey area and to determine if any identified wetlands or surface water features may contain endangered species or if such features are used for public recreation. The wetland survey was performed in accordance with the scope of work described in the Revised Sampling and Analysis Work Plan (WSP 2010a).

The survey focused on areas to the west and to the south of the facility. The Groundwater Potentiometric Surface Map, Figure 8-2, depicts the groundwater flow direction as northwest from the locations of wells NW-10, NW-11, and MW-05-2-100. The property to the north of the facility is therefore downgradient from the facility. According to the U.S. Fish & Wildlife Service, National Wetland Inventory, the property to the north of the Facility is classified as a wetland, including the area northwest of wells NW-10, NW-11, and MW-05-2-100.

Paragraphs 61 and 62 of the AOC required, among other things, submission of a work plan for carrying out a survey to identify any wetlands, creeks, or lakes within a one (1) mile radius down-gradient and beyond the Facility's property boundary. The Work Plan failed to include the down-gradient areas to the north of the Facility property, identified in Figure 8-2. This is a data gap that will need to be addressed.

**Comment 11:**

Page 51, section 6.2.4 of the Report states the following:

Cadmium was detected in samples collected from WSD-07 (0-0.5 feet), WSD-08 (0-0.5 feet), WSD-09 (0-0.5 feet), and WSD-10 (0-0.5 feet) at concentrations above the IDEQ Risk Based IDTL of 1.4 mg/kg. Cadmium concentrations ranged from 0.4 mg/kg (WSD-02,-0.5-1 foot) to 81.6 mg (WSD-10, 0-0.5 feet). Overall, only the cadmium concentration in sample WSD-10, 0-0.5 foot was substantially higher than other samples. For all other metals, concentrations were similar at all locations.

Sampling of sediment from Woodall Springs clearly shows cadmium impacts above soil background (0.869 mg/kg) at sample locations WSD-07 through WSD-10 and it also shows fluoride impacts above soil background (3.95 mg/kg) at sample locations WSD-06 through WSD-10.

Paragraphs 61 and 62 of the AOC required, among other things, submission of a work plan for carrying out activities to characterize the potential pathways of contaminant migration and to identify actual or potential human and/or ecological receptors to contaminant migration. Section 3 of the Work Plan stated the following:

> This section presents a preliminary site conceptual model (CSM) of the Site. It has been developed based on a review of information regarding Facility operations, Site development, and available groundwater monitoring data. The CSM identifies potential areas of interest for contamination sources, potential constituents of interest, potential media of concern, and potential exposure pathways including exposure routes, exposure points, and receptors. The CSM will be updated, as appropriate, based on the findings of the investigations presented in this Work Plan.

The Report lacks any characterization or discussion of the potential exposure pathways of contaminant migration (i.e. transport mechanisms) into the Woodall Springs and it fails to identify any potential human and/or ecological receptors (i.e. invertebrates, fish, migratory waterfowl, etc.) to the contaminant migration into the Woodall Springs. The Report will need to be revised to address this.

**Comment 12:**

Page 57, section 8.1.2, paragraph 1 of the Report states the following:

> In October 2011, discrete interval groundwater sampling was conducted at the 11 groundwater monitoring wells where flow meter testing was conducted and the results were reported to EPA in a letter dated January 18, 2012 (WSP 2012b) and the Report on Work Plan for Additional Requirements (WSP 2012e). The objective of the discrete interval groundwater sampling was to determine whether groundwater quality in the targeted zones was significantly different from water quality measured in the entire water column (i.e., whether or not intra-well mixing of various groundwater inputs affects the groundwater sampling results).
>
> A comparison of analytical results for discrete interval sampling and concurrent semi-annual groundwater sampling results, which utilized a three well volume purge and sample methodology, did not indicate significant differences in groundwater concentrations for the majority of the detected analytes. Given the similarity between discrete interval sample results and three well volume purge sample results, WSP concluded in the Report on Work Plan for

Additional Requirements (WSP 2012e) that no further discrete interval groundwater sampling was warranted.

By letter dated May 11, 2011, EPA directed that discrete interval groundwater sampling and other tests be carried out at existing wells with screens exceeding 20-feet in length or those with open hole completions. The Work Plan for Additional Requirements dated July 11, 2011 defined the scope of the discrete interval groundwater sampling tests. The discrete interval groundwater sampling and other tests could not be completed at all wells per the work plan due to a variety of reasons identified in a letter to EPA from WSP Environment & Energy dated January 18, 2012. In some cases the PVC casing of the well was reportedly constricted, preventing deployment of instrumentation, and in other cases the straddle packer was not deployed to the targeted depth. Not all of the wells were pumped at rates sufficient to overcome the natural differences in hydraulic potential. The contractor was unable to install a pump in some well bores, capable of overcoming the rates of inflow from the higher pressured intervals. Consequently, the water recovered in the sampling appeared uniform over the wells open interval.

The data obtained from wells with extensive screen intervals is of questionable value. The inability to obtain depth discrete samples from those wells remains a data gap. Part of this data gap can be met by the installation and screening of wells in discrete intervals and measuring the hydraulic heads in each zone. Addressing the other portion of this data gap, which includes the effect of vertical migration of water and contaminants in these wells, will necessitate the plugging and abandonment of these long-screened wells.

**Comment 13:**

Page 69, section 8.5.1 of the Report states the following:

> On May 29, October 15, and December 10, 2012, groundwater levels were measured in all monitoring wells in existence at the time, and the groundwater elevation data are included in Tables 8-3 through 8-5. Groundwater elevation data collected semi-annually since 1999 are presented in Appendix 8-5. The December 10, 2012 data were used to create a bedrock potentiometric surface map (Figure 8-2) using Surfer ® graphing software and linear drift kriging for interpolation between monitoring wells. Minor adjustments were made to the computer-generated potentiometric surface map to remove localized kriging artifacts. For monitoring well pairs, the groundwater elevation from the shallow well was used to generate the contour map, unless the shallow well was screened significantly higher than the screened interval for adjacent groundwater monitoring wells (e.g. A-20-056).

At present there is insufficient data from depth discrete screened intervals to allow contouring of each interval to yield meaningful results. Artifacts of the current approach are visible on the figures provided. One example is the contour pattern in the area of MW05-3-240 (with a screen interval of 100 feet) which contours at least 20 feet higher than the rest of the available wells in the area. This data gap will need to be addressed by completing depth discrete screens in each flow top/interbed of interest. It may be possible to begin this process by contouring only the wells with discrete screens and producing different figures for each flow-top of horizon of interest. However, the presence of many long-screened wells will continue to obscure the pattern of hydraulic heads across the site by flooding low potential zones with flow from high potential zones. For example, MW-B-120 under static conditions is flooding the horizon from 60 to 80 feet bgs with water sourced from 100-120 feet bgs with approximately 770,000 gallons of water per year. The effect of this water movement on the chemistry and hydraulic heads in each horizon is unknown. There is an insufficient number of groundwater monitoring wells with depth discrete screened intervals to allow complete contouring of groundwater potential at the facility. This is a data gap that will need to be addressed through installation of additional groundwater monitoring wells.

**Comment 14:**

Page 86, section 11 of the Report - Updated Conceptual Site Model

This section provided no information at all to identify actual or potential human and/or receptors of contaminant migration. This is a stated purpose of the Administrative Order.

Paragraphs 61 and 62 of the AOC required, among other things, submission of a work plan for carrying out activities to characterize the potential pathways of contaminant migration and to identify actual or potential human and/or ecological receptors to contaminant migration. Section 3 of the Work Plan stated the following:

> This section presents a preliminary site conceptual model (CSM) of the Site. It has been developed based on a review of information regarding Facility operations, Site development, and available groundwater monitoring data. The CSM identifies potential areas of interest for contamination sources, potential constituents of interest, potential media of concern, and potential exposure pathways including exposure routes, exposure points, and receptors. The CSM will be updated, as appropriate, based on the findings of the investigations presented in this Work Plan.

Section 12 of the Work Plan stated that the Report would include at a minimum the following:

- a discussion and refinement of the Preliminary CSM, including constituent fate and transport and the potential for migration beyond the Facility boundary

The State of Idaho has conducted source water assessments throughout the state, including at least four assessments for the City of Soda Springs Public Water Supply (PWS# ID6150017). These reports show that the source water assessment area, three year time of travel delineation area, encompasses a zone adjacent to the south boundary of the Nu-West CPO property. The reports also state that the city's public water supply system serves approximately 3,058 people through 1,554 connections.

These reports are available to the public at the following link:

http://www.deq.idaho.gov/water/swaOnline/LogIn.aspx

This is a glaring omission from the CSM.

Furthermore, there are at least three residential dwellings at about the approximate location of the Lowry well. Past sampling of the Lowry well has shown the groundwater to exceed the MCL for nitrate.

This is the fundamental level of detail necessary to include in a CSM, which the present draft is lacking. A revised draft of the CSM will need to identify actual and potential human and/or receptors of contaminant migration, including at a minimum the omissions identified above.

**Comment 15:**

Page 86, section 11 of the Report - Updated Conceptual Site Model

The CSM lacks a discussion of the fate and transport for contaminant migration. For example, low pH fluids have been identified at a shallow depth within the main plant, but not elsewhere. Groundwater exceeds the federal maximum contaminant level (MCL) for several metals, wet chemistry, and radiological parameters and it also exceeds several Idaho groundwater quality standards. No analysis is provided as to how contaminants migrate into the basalt flow zones, whether the variability and range of contaminants is traceable and can be linked to potential sources for verification. Elevated concentrations of fluoride, nitrate, phosphate, sulfate and other constituents are present in groundwater from the site. All these compounds are derivable from materials handled and demonstrated to be released to shallow soils and groundwater. The CSM will need to be revised to include a linkage to sources and a discussion on the fate of these releases. See comments 8, 11, and 14.

**Comment 16:**

Page 94, section 11.2.2 of the Report states the following:

> Groundwater at the CPO Facility has been monitored by a network of 51 groundwater monitoring wells, 5 Nu-West production wells, 5 off-site production wells, and 2 domestic wells.

There are only 39 wells currently with discrete screens of less than or equal to 20 feet. Additionally, many of those wells are of 2-inch construction and as such are too small to pass tools necessary to assess the aquifer horizon which they monitor (the seven A-series wells, A-1 through A-8). This leaves 32 wells. The other wells used in the monitoring program do not meet the criteria established for a monitoring well.[2] Specifically, they are incapable of yielding a representative sample of ground-water. This is primarily due to mixing of multiple contributing zones. This issue is important because the long screened wells are likely comingling waters from different flow zones of different chemistry or acting as preferential pathways for contaminants. Alternatively, long-screened wells may be delivering significant quantities of clean, deep-sourced water to contaminated zones and accelerating their migration off site.

**Comment 17:**

Page 96, section 11.2.2.2 of the Report states the following:

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[2] See Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers, US EPA, May 2002 *http://www.epa.gov/superfund/remedytech/tsp/download/gw_sampling_guide.pdf*

Nine of the well pairs (A-20, A-25, A-27, A-28, A-29, A-30, A-31, A-32, A-35) are screened within the basalt aquifer. One of the well pairs (A-14-180/A-15-105) includes a shallow well screened in the basalt aquifer and a deep well screened in the sedimentary aquifer. Two well pairs (A-05-193/A-06-118 and the A-36 well pair) include two wells screened in the sedimentary aquifer. The well pairs are located in the area west of the Old Gyp Stack (two well pairs), around the Cooling Ponds (five well pairs), in the Main Processing Area (three well pairs), and on the eastern portion of the Site (one well pair). With the exception of the A-05-193/A-06-118 and the A-35-080/A-35-155 well pairs, the groundwater elevations measured during the three gauging events in 2012 in the shallow and deep wells were within one foot of each other with resulting vertical gradients of ±0.03, which suggests limited potential for vertical flow within or between the aquifers at these locations.

The accuracy of this statement depends entirely on the vertical hydraulic conductivity of the aquifer. In this case, with extensive fractured basalt and significant faulting, it is likely that preferential flow is facilitated by vertical fractures. It takes very little gradient to move large quantities of water through a fracture such as those anticipated on this site. A very dynamic system may reveal itself as aquifer testing is conducted on this site.

**Comment 18:**

Page 103, section 11.4.1.2 of the Report states the following:

> Although there are no established groundwater screening criteria for ammonia and orthophosphate, groundwater samples from the Na-SO4 trend contain higher concentrations of both ammonia and orthophosphate than Ca-Mg-HCO3 type samples (Figure 8-16). Similar to other constituents, the highest concentrations of ammonia (approximately 30 to 70 mg/l) and orthophosphate (approximately 50 to 90 mg/l) are associated with samples collected from monitoring wells located on the west side of Cell #1 and Cell #2/#3 of the Old Gyp Stack.

Ammonia, particularly as reported in here as ammonia-N is directly comparable to nitrate-N. The nitrogen making up the ammonia will oxidize to nitrate as soon as oxygen is available to the groundwater. For this reason, it is appropriate to compare the measured ammonia concentrations with the nitrate standard so long as both are expressed in the form of their nitrogen weight, as is indicated by the nomenclature, "ammonia-N" and "nitrogen-N" referring only to the nitrogen portion of each molecule.

**Comment 19:**

Page 109, section 12.4 of the Report states the following:

> In accordance with the approved work plan, a surface water and sediment investigation was conducted to characterize surface water and sediment conditions within Woodall Spring and Woodall Spring Ditch and to determine if CPO Facility operations have resulted in degradation of water or sediment quality in Woodall Spring Ditch. The surface water sampling results demonstrated that CPO Facility operations have not resulted in degradation of water quality in Woodall Spring Ditch. Concentrations of all metals were below applicable standards with no

> significant differences in samples collected from upstream and downstream locations. The sediment sampling results indicated that constituent concentrations detected at sample locations upstream of the CPO Facility were similar to concentrations detected at locations in proximity to or on the Facility. Only the cadmium concentration in one downstream sample (WSD-10) was substantially higher than other samples and above the IDEQ Risk Based IDTL.

The latter half of this statement is not factually correct. As discussed in comment 11, sediment sample locations WSD-06 through WSD-10 of Woodall Springs showed both cadmium and fluoride impacts above background levels. Cadmium levels were highest in those sediment samples obtained closest to the impoundments. Cadmium and fluoride are both significant contaminants from facility operations. The cadmium concentrations detected at sample locations upstream of the CPO Facility (WSD-01 through WSD-05) were <u>not</u> similar to concentrations detected at locations in proximity to or on the Facility (WSD-06 through WSD-10).

Revise the Report to correct the erroneous statements.

**Comment 20:**

> Figures 4-3 through 4-8

These figures depict the soil sampling locations and whether or not the following contaminants in the deepest sample were detected above or below the screening level: cadmium, selenium, nitrate, and fluoride.

Section 12 of the Work Plan stated that the Report would include at a minimum the following:

- figures illustrating Site conditions, including but not limited to:
  - sample concentrations that exceed IDEQ screening criteria or other potentially applicable screening levels for various media

The presentation of data only from the deepest sample doesn't make clear the presence in many borings of significantly higher values observed at shallower sample depths. This approach might be appropriate when the only pathway for migration is downward and uniform delivery spatially is expected. However, on this site at least two processes make this unlikely. First, demonstrated shallow saturated zones are present, apparently migrating (based on reported gradients) and capable of transmitting contaminants of concern down-gradient in the saturated zone at this site. Second, anticipated vertical migration to the water table is controlled by the unsaturated hydraulic conductivity. Spatial heterogeneity in this parameter tends to channel releases into the same discrete pathway once the release starts. For the purpose of this Report, a more informative graphic is necessary.

Modification of these figures is necessary by including a symbol for "constituent in all samples is less than the SSL"; another symbol for, "constituent in all samples exceeds the SSL"; and "constituent in the deepest sample exceeds the SSL". The maximum concentration observed in each boring needs to be included next to each soil-boring symbol.

Figure 4-7 similarly requires modification to report the value of the highest reported concentration from each sample as well as the value at the deepest depth.

Figure 4-8 requires modification to include a symbol for borings which exceed the SSL at any depth and a different symbol for borings which exceed the SSL at the greatest depth.

Revise the figures to address the above comments.

**Comment 21:**

Figure 8-2

As discussed in the comment 13 above, the potentiometric surface map requires modification or augmentation. The obvious artifact of MW05-3-240 raising the contours at its location by 20+ feet is clear and unlikely to represent the actual distribution of gradients across the site. At the current time, there are insufficient wells in each flow-top/zone to permit contouring each horizon. As this data gap is filled, the pattern and differences between horizons should become clearer. For this figure and this data, add the raw foot difference in head to the figure at each location where multiple screens are present. Present the wells with screens in excess of 20 feet in some other color. Develop a new figure with only the data from the discrete well screens of less than 20 feet for comparison.

**Comment 22:**

Figure 8-8

It is not clear as to which well or sample corresponds to each point. Either revise Figure 8-8 or report the data on additional figures. For example, open blue and solid blue circle wells cover a significant range of values but which point goes with this value cannot be determined. Patterns of ground-water evolution and mixing cannot be established without this identification. Revise the figure accordingly.

**Comment 23:**

Figure 11-2

Another fault appears to be appropriate to add parallel to the others and crossing the point defined by the intersection of section lines of J-J' and K-K'. This appears indicated by the surface of the Salt Lake and the basalt, and to a lesser extent, the top of the basalt between A-35 and A-36 as shown on sections K-K' and J-J' in Figure 11-4. Revise the figure accordingly.

**Comment 24:**

Figure 11-4

Section 12 of the Work Plan stated that the Report would include at a minimum the following:

- figures illustrating Site conditions, including but not limited to:

- Site stratigraphy including subsurface information on updated cross sections.

The information provided on section B-B' needs to include the flow unit boundaries as determined by the geophysics conducted to date. If the figure becomes too complex, another figure should be added with the wells, the screened intervals and the flow unit boundaries. Additional figures with the same background, but featuring the concentrations of both orthophosphate and sulfate, and the exceeded regulatory standards are necessary. Isoplethic maps showing patterns of orthophosphate, sulfate, nitrate, fluoride, and metals exceeding the MCL are necessary. These maps need to show data by depth discrete horizons as this data becomes available. Revise the Report to include the additional information.

**Comment 25:**

Figure 11-11

The Figure is mislabeled as "Figure 4-11". Revise Figure to correct.

**Comment 26:**

Table 4-14

The values in excess of screening levels are not bolded. Revise the table to include bolded values for those in excess of the screening levels.

**Comment 27:**

Table 8-6

The turbidity values provided for monitoring wells A-13 through A-25 are reported as 0.0. This is unusual and requires an explanation. There is a general lack of correspondence between the dissolved oxygen (DO) and the oxidation reduction potential (ORP) values reported. A review of the data appears to indicate that the DO values are generally the correct value, as indicated by the concentrations of redox sensitive metals such as manganese, with the exception of A-23-95 where a DO of 0.07 appears to be in error.

**Comment 28:**

Tables 8-7 and 8-8

As with table 8-6, several of the DO and ORP values fail to match. Several of the DO values are higher than it is physically possible to achieve at the groundwater temperatures reported and the facility elevation. This requires an explanation.

**Comment 29:**

Table 8-13

This table did not include data for the full list of metals. Compare to Tables 8-9, 8-10, and 8-11.

Table 8-9 shows that the federal MCL for arsenic was exceeded in groundwater samples from monitoring wells A-18-110, A-19-095, A-20-056, and A-20-090. Table 8-9 also shows that the Idaho groundwater standard was exceeded for manganese in these monitoring wells during the same sampling event. Table 8-13 shows that the federal MCL for arsenic was exceeded in groundwater samples from several monitoring wells, but it is unknown if the Idaho groundwater manganese standard was simultaneously exceeded due to the omission of that chemical parameter from Table 8-13.

Revise the table to include the full list of chemical parameters and the recorded data values.

**Comment 30:**

Appendix 08-07

Radium 226 analyses were performed for some groundwater samples, the data of which was included in Appendix 08-07. Revise the Report to include radiological data in the main body of the Report along with the other chemical and metal parameters, as was reported in with Tables 8-1 through 8-15.